

Fig. 2 is a schematic diagram illustrating a structure of a LCD backlight inverter according to the present invention, in which a component, which is designated with no reference number in Fig. 2 but is identical to the DC/AC converter (10) in Fig. 1 in structure, is also called a DC/AC converter.

The various components of the structure shown in Fig. 2 have the following operating characteristics: when a supply voltage is applied to a UVLO (120), a stable bias voltage is generated in a VREF (110) and provided to each component shown in Fig. 2.

Then, the each component performs normal operations.

Then, the DC/AC converter which is designated with no reference number turns on a downstream lamp to make the lamp light up. Depending on the lighting or non-lighting operation of the lamp, a current flowing through the lamp is fed back via a plurality of resistances and diodes to be introduced into an inverting terminal of an error amplifier ERROR AMP.

Here, the error amplifier ERROR AMP compares the current introduced into the inverting terminal with a signal DIM inputted to a noninverting terminal, and outputs its comparison value. The output comparison signal of the error amplifier ERROR AMP is introduced into a first inverting (-) terminal of a second comparator (CMP2), which compares the signal introduced into the first inverting (-) terminal of the second comparator (CMP2) with a triangular wave generated by an OSC (150) and introduced into a noninverting (+) terminal, and outputs its comparison value to an RS latch (designated with no reference number).

Here, the signal outputted from the second comparator (CMP2) is characterized in adjusting the duty cycle of pulses for driving and controlling bridge type MOS-FETs constituting the DC/AC converter. The signal outputted from the second comparator (CMP2) is provided to drivers 180 and 170 via the RS latch, and the MOS-FETs are driven and controlled by the drivers (180, 170).

In addition, in order to generate dimming pulses, a pulse width modulation oscillator PWM OSC (130) is internally provided to control the output of the error amplifier ERROR AMP. A shutdown protection unit SDP (160) functioning as a protection circuit in response to a lamp open operation or an abnormal operation detects whether a feedback current F/B flows or not. If the feedback current does not flow, an over voltage

protection unit OVP (140) is controlled to protect a system.

Further, in addition to a warning signal inputted in the shutdown protection unit SDP (160), the over voltage protection unit OVP (140) confirms whether the original power supply (VCC) is in an over-voltage state, and correspondingly provides a protection signal to a second inverting (-) terminal of the second comparator (CMP2) to adjust the duty cycle so as to adjust the voltage applied to the downstream lamp.

Here, the shutdown protection unit SDP (160) has a detailed structure as shown in Fig.3, in which the feedback current (F/B) flowing through the lamp in response to the lighting or non-lighting operation of the lamp, after being stabilized via resistances and capacitors, is divided via resistances R1 and R2 as shown in Fig. 3.

Further, the initial voltage which is not divided via the resistances (R1, R2) is compared with a reference voltage in a comparator OP1, so as to detect whether the lamp open operation or abnormal operation of the lamp occurs. If the lamp open operation takes place, the feedback current F/B does not flow, and the output signal of the comparator OP1 is switched to a high state.

Furthermore, depending on the state of the voltage divided via the resistances (R1, R2), a transistor Q1 performs an on/off operation. In response to the on/off operation of the transistor Q1, an output signal of a comparator OP2 is switched to low/high states.

Then, an output signal of a latch RS synchronized with variation of the output signal of the comparator (OP2) uses an initial bias. In this case, the triangular wave from the OSC (150) is smoothed.

Hereinafter, a structure of the over voltage protection unit OVP (140), which receives the output signal from the SDP as shown in Fig. 4, will be described briefly, and a detailed circuit structure of Fig. 4 is shown in Fig. 5.

The operation of the over voltage protection unit will be described with reference to Fig. 5. The output signal of the SDP (160) is outputted to the base of a transistor Q2, and the transistor Q2 turns on when the output signal of the SDP (160) is in a high state.

Then, a transistor (Q3) which has its collector connected to the collector of the transistor (Q2) and to its base turns off. That is to say, all voltage is applied to both terminals of a resistance (R3), while a ground voltage is applied to the collector and base of the transistor (Q3).

At the same time, a transistor (Q4) which has its base connected to the base of the transistor (Q3) turns off. Since the transistor (Q4) turns off, the base of a transistor (Q5) is kept in a high impedance state, so that a transistor (Q6) which has its base connected to the base of the transistor (Q5) turns on.

When the transistor (Q6) is in an ON state, the driving voltage VCC flows through a resistance (R4) and a Zener diode (ZD) so that a transistor (Q7) turns on.

The voltage at a dividing point of resistances (R5, R6) dividing a reference voltage fluctuates, and the amount of fluctuation changes an output signal of a comparator (OP3), so that the output signal of the second comparator (CMP2) is altered to control the operation of the drivers (170, 180), thereby performing shutdown protection operations and normal operations.

Further, the driving voltage VCC, after being divided by resistances that are not shown in the Figure, is inputted to an inverting data input terminal of the comparator (OP3) through a seventh resistance (R7), and compared with a reference voltage inputted to a noninverting input terminal. When it is judged that an over-voltage condition occurs, the output signal of the comparator OP3 is altered. After the output signal of the second comparator (CMP2) is altered, the operation of the drivers (170, 180) is controlled to perform over-voltage protection operations and normal operations.